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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, SESSION 2019/2020

EEL4116 – POWER STATIONS
(LE)

14 OCTOBER 2019
2:30 PM – 4:30 PM
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This Question Paper consists of three pages including the cover page with five Questions only.
2. Answer **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please print all your answers in the Answer Booklet provided.

Question 1

- (a) A single storey house has the following connected loads:

Load	Rating (W)	Quantity
A	80	2
B	40	4
C	60	5
D	10	10
E	120	3

- (i) Define what is the use of demand factor. [2 marks]
 - (ii) If the maximum demand is 700W, calculate the demand factor. [4 marks]
 - (iii) Explain the possible range of values for demand factor. [3 marks]
- (b) You are tasked to design a power plant to be operating in the year 2020 (which is a leap year) with a reserve capacity of 25% above the peak load.
- (i) Given that the maximum demand is 80 MW and the annual load factor is 0.70, determine the annual capacity factor. [6 marks]
 - (ii) If the use factor is 0.60, estimate the hours during which the plant is not in service for the year 2020. [5 marks]

Question 2

- (a) List down THREE types of conventional generation plants other than steam (thermal) power station. [3 marks]
- (b) Explain the FOUR processes involved in a steam power station which works based on the Rankine cycle principle. [12 marks]
- (c) A hydroelectric power plant is expected to have an amount of water available for power generation of $500 \times 10^6 \text{ m}^3$ over a period of one year. The overall efficiency of the plant is 0.65. If the available head is 25 m and the load factor is 0.55, recommend a suitable rating of the turbine-generator. [5 marks]

Question 3

- (a) You were tasked to identify a site suitable for the deployment of a nuclear power station. Discuss THREE factors that you will consider while performing the task. [6 marks]
- (b) Diesel power stations are suitable as standby power generation sets especially in remote areas. Explain the essential components of a diesel engine plant. [14 marks]

Continued...

Question 4

A substation acts as the junction point in the power network by interconnecting the transformers, transmission lines and distribution feeders via switches and busbars.

- (a) Explain FIVE design considerations prior to the construction of a substation. [10 marks]
- (b) There are several possible substation configurations and one of it is ring bus. Illustrate the ring bus configuration with an appropriate diagram. Clearly label each of the component. Discuss TWO advantages and TWO disadvantages of this configuration. [10 marks]

Question 5

- (a) Other than the technical aspects, the economic factor of a power plant is just as important. Explain the TWO types of costs of generating electric power. Provide TWO examples for each of the type of the cost mentioned. [8 marks]
- (b) A utility company needs to invest RM50 million to setup a power plant. If the salvage value is 6% of its capital cost and the annual compound interest is 5%, estimate the useful life of the plant by using both straight line method and sinking fund method if the annual deposit is RM1.5 million. Explain the difference (if any). [8 marks]
- (c) List down FOUR tariff structures used by the utilities. [4 marks]

End of Paper.